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**EUROPEAN PATENT APPLICATION**

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(54) **Mercury-free high-intensity discharge lamp operating apparatus and mercury-free metal halide lamp**

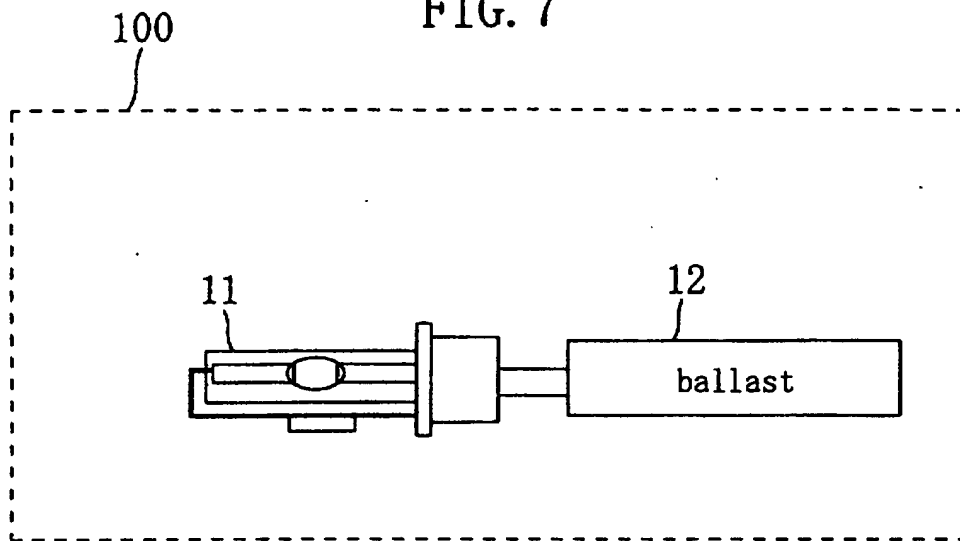
(57) A mercury-free high-intensity discharge lamp operating apparatus (100) includes a horizontally operated high-intensity discharge lamp (11) including an arc tube (1) in which a luminous material (6) is enclosed and a pair of electrodes (3) are arranged in the arc tube (1); a ballast (12) including an alternating current generation means for supplying alternating current to the pair of electrodes (3); and a magnetic field application means (10) for applying in substantially vertical direction a magnetic field having a component that is substantially perpendicular to a straight line connecting heads of the pair of electrodes (3); wherein mercury is not included as the luminous material in the arc tube. The present invention satisfies the relationship

$$0 < (100BW / f) - P_o d < 100$$

wherein B(mT) is the magnetic field applied to a center between the heads of the pair of electrodes (3), d(mm) is a distance between the heads of the pair of electrodes (3),  $P_o$ (MPa) is a pressure inside the arc tube (1) during steady-state operation, W(W) is a power consumed during steady-state operation, and f(Hz) is a steady-state frequency during steady-state operation.

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FIG. 7





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# EUROPEAN SEARCH REPORT

Application Number  
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P,Y	<ul style="list-style-type: none"> <li>* page 2, line 6 - line 9 *</li> <li>* page 2, line 28 - line 33 *</li> <li>* page 3, line 1 - line 26 *</li> <li>* page 4, line 11 - page 9, line 22 *</li> <li>* claims *</li> </ul>		
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The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>16 October 2001</b>	Examiner <b>Martin Vicente, M</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  .....  &amp; : member of the same patent family, corresponding document</p>			

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### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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# EUROPEAN SEARCH REPORT

Application Number  
EP 01 11 3019

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The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>16 October 2001</b>	Examiner <b>Martín Vicente, M</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**LACK OF UNITY OF INVENTION**  
**SHEET B**

Application Number  
EP 01 11 3019

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

**1. Claims: 1-10**

Method of using discharge lamps

**2. Claims: 11-20**

Indium halide lamp



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# EUROPEAN SEARCH REPORT

Application Number  
EP 01 11 3019

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The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>16 October 2001</b>	Examiner <b>Martín Vicente, M</b>
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EPO FORM 1503 (03.02.02) (P04C01)



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Application Number  
EP 01 11 3019

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The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>16 October 2001</b>	Examiner <b>Martín Vicente, M</b>
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The present search report has been drawn up for all claims			
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Application Number  
EP 01 11 3019

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Place of search <b>THE HAGUE</b>		Date of completion of the search <b>16 October 2001</b>	Examiner <b>Martín Vicente, M</b>
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The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>16 October 2001</b>	Examiner <b>Martín Vicente, M</b>
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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